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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/531,026

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Dirk Jeroen Breebaart

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS

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BRIARCLIFF MANOR, NY 10510

EXAMINER

LERNER, MARTIN

ART UNIT

PAPER NUMBER

2626

MAIL DATE

DELIVERY MODE

12/04/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/531,026

Applicant(s)

BREEBAART ET AL.

Examiner

Martin Lerner

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 to 15 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 to 15 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. ____.
 - 3) ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

On page 8, lines 22 to 24, it appears that " (k,n) ", on the left side of the Equation (1) should be " $F'(k,n)$ ".

Appropriate correction is required.

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Signal Filtering by Modifying Frequency Components Related to a Previous Frame

Information Disclosure Statement

3. The Information Disclosure Statement filed 07 October 2005 fails to comply with 37 CFR 1.98(a)(1), which requires the following: (1) a list of all patents, publications, applications, or other information submitted for consideration by the Office; (2) U.S. patents and U.S. patent application publications listed in a section separately from citations of other documents; (3) the application number of the application in which the information disclosure statement is being submitted on each page of the list; (4) a column that provides a blank space next to each document to be considered, for the examiner's initials; and (5) a heading that clearly indicates that the list is an Information

Disclosure Statement. The Information Disclosure Statement has been placed in the application file, but the information referred to therein has not been considered.

Applicants have submitted an International Search Report, but have not enclosed a list of documents on a standard Form PTO-1449. Applicants are requested to list the references on a standard Form PTO-1449 to have them considered.

4. The Information Disclosure Statement filed 07 October 2005 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed.

Applicants are requested to submit copies of the two international patents, WO 89 09985 and EP 0 538 877, cited by the International Search Report, and which appear relevant to examination, but are not readily available to the U.S. Patent Office.

Claim Objections

5. Claims 1 to 11 are objected to because of the following informalities:

In claim 1, line 6, the “;” before “related” should be deleted.

In claim 5, “is comprises” is not grammatical.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 1 to 15 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Independent claims 1 and 12 to 14 are non-statutory because they represent a computer-related mathematical algorithm operating only upon abstract entities without being directed to any real-world physical quantities. Applicants should restrict their claims to an audio signal, which is disclosed as the main embodiment by the Specification, e.g. at Page 4, Lines 9 to 10 and Page 6, Lines 5 to 6, because an audio signal is a real-world physical quantity, but an information signal is not. Applicants' independent claims only set forth abstract mathematical quantities of "frequency domain components", "an information signal", "a first frame", "a first filter response", and "a previous frame". Independent claims 1 and 12 to 14 should be amended non-preambularly to reflect that the information signal is an audio information signal, that the frequency domain components are audio frequency domain components, and that the frames are frames of audio information. See MPEP §2106 – §2106.02.

Independent claim 14 is non-statutory because it is a signal claim. Signal claims are non-statutory because they do not represent a recognized statutory category of invention, e.g. a process, machine, manufacture, or composition of matter. Specifically, it is maintained that a signal claim is not a composition of matter.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1 to 15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Independent claims 1 and 12 to 14 are equivalent to "single means" claims because they recite only a single means, a single element, or single method step. The single step is modifying frequency domain components of a first frame according to a function of a previous frame. "Single means" claims were held to fail to meet the enablement requirement of 35 U.S.C. §112, 1st ¶. See MPEP §2181 V, §2164.08(a), and *In re Hyatt*, 708 F.2d 712, 714-715, 218 USPQ 195, 197 (Fed. Cir. 1983).

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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11. Claims 1 to 6 and 11 to 15 are rejected under 35 U.S.C. 102(b) as being anticipated by *Lockwood et al. (WO '738)*.

Note: The rejection is based upon *Lockwood et al. (WO '738)*, which has a publication date of 25 March 1999, and so is prior art under 35 U.S.C. §102(b).

However, the rejection refers to Columns, Lines, and Figures of *Lockwood et al. (US '489)*, which is a corresponding equivalent in English, and certified translation of *Lockwood et al. (WO '738)*.

Regarding independent claims 1 and 12 to 14, *Lockwood et al. (WO '738)* discloses a method, apparatus, and device for processing a digital speech signal, comprising:

“means for modifying frequency domain components of the information signal according to a desired filter” – noise is suppressed in a digital speech signal by applying an a priori noise suppression filter with a frequency response $H_{p_{n,i}}$ from Equation (2) (column 4, lines 25 to 46: Equation (2): Figure 1); noise suppression filter is applied to frequency bands i of a signal that is transformed into the frequency domain by a conventional fast Fourier transform (column 3, lines 53 to 61); spectral components $E(\hat{h})_{p,n}$ are obtained by multiplying a priori noise suppression filter having a frequency response $H_{p_{n,i}}$ (“according to a desired filter”) by frequency domain signals $S_{n,i}$, subject to a noise floor coefficient, which is equivalent to an operation of spectral subtraction of the noise from the frequency domain signals (column 4, lines 46 to 58: Equation (3));

“wherein the step of modifying frequency domain components further comprises modifying frequency domain components of a first frame of said information signal

according to an first actual filter response the first actual filter response being a function of the desired filter response and information related to a previous frame of the information signal" – a priori noise suppression filter has a frequency response $Hp_{n,i}$ ("a desired frequency response") that depends upon ("being a function of") a value of $B(\hat{h})_{n-r1,i}$, which is the long term estimate of the noise in the various frequency bands (column 4, lines 16 to 46: Equation (2)); specifically, $B(\hat{h})_{n-r1,i}$, the long term estimate of the noise, depends upon a noise estimate from a previous frame $n-1$, i.e. $B(\hat{h})_{n,i}$ depends upon $B(\hat{h})_{n-1,i}$ (column 6, lines 33 to 41: Equations (5 and (6)); thus, the desired frequency response, $Hp_{n,i}$ is "related to a previous frame of the information signal".

Regarding claim 2, *Lockwood et al. (WO '738)* further discloses:

"segmenting an information signal into a number of signal frames" – a windowing module 10 formats the signal s in the form of successive windows or frames each made up of a number N of digital samples (column 3, lines 43 to 52: Figure 1);

"transforming the signal frames to obtain frequency domain components of the respective signal frames" – the signal frame is transformed into the frequency domain by a module 11 using a conventional fast Fourier transform (FFT) to deliver a set of $N=256$ frequency components $S_{n,f}$ of the speech signal, where n is the number of the current frame and f is a frequency (column 3, lines 53 to 61: Figure 1);

"inverse transforming the modified frequency domain components to obtain filtered signal frames" – following spectral subtraction, module 65 then reconstructs the

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noise-suppressed signal in the time domain by applying the inverse fast Fourier transform (IFFT) to the samples of frequency $S_{n,f}^3$ (column 10, lines 15 to 25: Figure 1);

“performing a recombination of the filtered signal frames to obtain a filtered information signal” – the resulting components $S_{n,f}^3$ are processed back into the time domain by the IFFT module 65, and a module 80 at the output of the IFFT module 65 combines, for each frame, the two signal blocks resulting from the processing of the two overlapping blocks (column 12, lines 31 to 38: Figures 1 and 9).

Regarding claim 3, *Lockwood et al. (WO '738)* discloses reducing artifacts relating to musical noise by employing a floor coefficient (column 4, lines 47 to 54: Figure 1).

Regarding claim 4, *Lockwood et al. (WO '738)* discloses overlap-add reconstruction of the signal by module 66 (column 10, lines 21 to 25: Figure 1).

Regarding claim 5, *Lockwood et al. (WO '738)* discloses that $B(\hat{h})_{n-1,i}$ (“the information related to a previous frame”) is an element of (“comprises”) an actual filter response of a previous frame for a noise floor when $E(\hat{h})_{n,i} = \beta B(\hat{h})_{n-1,i}$ (column 4, lines 47 to 54: Equation (3): Figure 1).

Regarding claim 6, *Lockwood et al. (WO '738)* further discloses:

“determining a desired filter response for the first frame” – noise is suppressed in a digital speech signal by applying an a priori noise suppression filter with a frequency response $H_{p_{n,i}}$ from Equation (2) (column 4, lines 25 to 46: Equation (2); $H_{p_{n,i}}$ is “a desired filter response”;

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“determining the first actual filter response for the first frame as a function of the desired filter response and at least a second filter response related to a previous frame of the information signal” – an actual filter response is either $H_{p_{n,i}} S_{n,f}$ or $\beta B(\hat{h}at)_{n-1,i}$; it is either the a priori noise suppression filter, $H_{p_{n,i}}$, or a noise floor of $\beta B(\hat{h}at)_{n-1,i}$ (column 4, lines 47 to 54: Equation (3): Figure 1); $\beta B(\hat{h}at)_{n-1,i}$ is “a second filter response related to a previous frame of the information signal” for calculating $E(\hat{h}at)_{n,i}$, because $B(\hat{h}at)_{n-1,i}$, the long term noise estimate, is related to a previous frame by Equations (5) and (6) (column 6, lines 33 to 41: Figure 1); $H_{p_{n,i}}$ is “the desired filter response”;

“applying the determined actual filter response to the first frame to obtain modified frequency domain components of the first frame” – an actual filter response of either $H_{p_{n,i}} S_{n,f}$ or $\beta B(\hat{h}at)_{n-1,i}$ is applied to a frame to obtain $E(\hat{h}at)_{n,i}$, which are the modified frequency domain components (column 4, lines 47 to 54: Equation (3): Figure 1).

Regarding claims 11 and 15, *Lockwood et al. (WO '738)* discloses processing a speech signal, which is an audio signal; implicitly, an audio signal may be stored.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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13. Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Lockwood et al. (WO '738)* in view of *LaRoche*.

Concerning claim 7, *Lockwood et al. (WO '738)* omits applying spectral subtraction so as to take into account phase properties of the signal. However, it is known to compensate for phase discontinuities in audio processing. *LaRoche* teaches processing an audio signal to eliminate artifacts from phase discontinuities. (Column 1, Line 36 to Column 2, Line 16) Specifically, *LaRoche* teaches:

“determining a phase difference of a frequency component of the desired filter response for the first frame and a corresponding frequency component of the filter response of a previous frame” – a phase shift is calculated between the beginning and end phases according to the expression $\Delta\phi(i)=\phi(i,t_b)-\phi(i,t_e)$ (column 9, lines 20 to 52); subscript i represent a harmonic component in a frequency domain;

“determining a desired phase change as a function of the determined phase difference” – a phase shift $\phi'(i,t)=\phi(i,t) + |(t - t_b) / (t_e - t_b)|\Delta\phi(i)$ is calculated to distribute the phase change across the entire loop duration (column 9, lines 20 to 52);

“determining a frequency component of the first actual filter response as the corresponding frequency component of the filter response of a previous frame modified by a phase change factor comprising the determined desired phase change” – harmonic adjuster 318 is implemented in a frequency domain (column 4, lines 59 to 67: Figure 3).

Concerning claim 7, it would have been obvious to one having ordinary skill in the art to apply a phase adjustment technique as taught by *LaRoche* for suppressing

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noise in a speech signal by a spectral subtraction method of *Lockwood et al.* (WO '738) for a purpose of eliminating artifacts caused by phase discontinuities.

Concerning claim 9, *LaRoche* teaches a phase adjustment technique to eliminate phase discontinuities ("reduce phase changes"). (Column 1, Line 36 to Column 2, Line 16)

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure.

Dolson, Takahashi, and Hoek disclose related art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin Lerner whose telephone number is (571) 272-7608. The examiner can normally be reached on 8:30 AM to 6:00 PM Monday to Thursday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

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ML
10/25/07

A handwritten signature in black ink, appearing to read "Martin Lerner", written over a horizontal line.

Martin Lerner
Examiner
Group Art Unit 2626